CLAIMS

We claim:

1. A method of sensitizing a sensing surface arranged to be passed by a liquid flow within a flow cell, comprising:

providing a laminar flow of a first sensitizing fluid and a laminar flow of a second fluid adjacent to the flow of the first sensitizing fluid such that the two laminar fluids flow together over the sensing surface with an interface to each other, at least said first sensitizing fluid being capable of sensitizing the sensing surface, and

adjusting the relative flow rates of first sensitizing fluid and second fluid to position the interface such that the first sensitizing fluid contacts a discrete sensing area of the sensing surface for selective sensitization thereof.

2. The method according to claim 1 wherein the second fluid does not interact with the sensing surface to thereby produce a sensitized area and a non-sensitized area on the sensing surface.

3. The method according to claim 1 wherein, in a further step, the first sensitizing fluid is replaced by a fluid that does not interact with the sensing surface, and the second fluid is replaced by a second sensitizing fluid that is capable of sensitizing the sensing surface differently than the first sensitizing fluid to produce two differently sensitized areas, optionally spaced apart by a non-sensitized area on the sensing surface.

4. The method according to claim 1 wherein the relative flow rates of the laminar flows are varied to displace the interface laterally and provide a gradient-sensitized area on the sensing surface.

5. The method according to claim 1 wherein the relative flow rates of the laminar flows are continuously varied to provide a continuous gradient-sensitized area on the sensing surface.

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6. The method according to claim 1 wherein an additional laminar flow of a third fluid is provided on the other side of the flow of the first sensitizing fluid so that the laminar flow of the first sensitizing fluid is sandwiched between the laminar flows of the second and third fluids.

7. The method according to claim 6 wherein the second and third fluids are not capable of sensitizing the sensing surface.

8. The method according to claim 7 wherein the method is repeated with at least one different sensitizing first fluid and with varied relative flow rates of the second and third fluids to provide at least two adjacent sensitized surface areas on the sensing surface.

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9. The method according to any one claims 1-8 wherein sensitization of the sensing surface comprises immobilizing an analyte-specific ligand to the sensing surface.

10. The method according to claim 9 wherein the analyte-specific ligand is selected from the group consisting of antigen, antibody, antibody fragment, oligonucleotide, carbohydrate, oligosaccaride, receptor, receptor fragment, phospholipid, protein, hormone, avidin, biotin, enzyme, enzyme substrate, enzyme inhibitor and organic synthetic compound.

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11. The method according to claim 1 or 6 wherein the first sensitizing fluid sensitizes an area on the sensing surface, and a second sensitizing fluid is applied transversely to the direction of the first sensitizing fluid to yield an overlapping sensitized area on the sensing surface.

12. The method according to claim 11 wherein the first sensitizing fluid sensitizes an area on the sensing surface, and at least two different second sensitizing fluids are applied transversely to the direction of the first sensitizing fluid to yield at least two overlapping sensitized areas on the sensing surface.

13. The method according to claim 11 wherein at least two different first sensitizing fluid sensitized at least two parallel areas on the sensing surface, and at least two different second sensitizing fluids are applied transversely to the direction of the first sensitizing fluid to yield a matrix of overlapping sensitized areas on the sensing surface.

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~~14. The method according to any one of claims 11-13 wherein at least the ligand of the first sensitizing fluid or the second sensitizing fluid is an analyte-specific ligand.~~

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15. The method according to claim 14 wherein the analyte-specific ligand is selected from the group consisting of antigen, antibody, antibody fragment, oligonucleotide, carbohydrate, oligosaccaride, receptor, receptor fragment, phospholipid, protein, hormone, avidin, biotin, enzyme, enzyme substrate, enzyme inhibitor and organic synthetic compound.

16. The method according to any one of claims 11-13 wherein at least the ligand of the first sensitizing fluid or the second sensitizing fluid is a bi-functional ligand.

17. A sensitized sensing surface made according to the method of any one of claims 1-16.

18. A method of analyzing a fluid sample for an analyte, comprising sensitizing a discrete sensing area on a sensing surface by the method according to any one of claims 1-16, contacting the sensing area with the fluid sample, and detecting interaction between the analyte and the sensing area.

19. The method according to claim 18 wherein at least one non-sensitized area on the sensing surface is used as a reference.

20. The method according to claim 18 wherein at least one sensitized area on the sensing surface is used as a reference.

21. A method of analyzing a fluid sample for an analyte, comprising:

providing a flow cell having a sensing surface associated therewith, wherein the sensing surface has at least two discrete sensing areas thereon; and

selectively contacting the fluid sample with at least one of the discrete sensing areas by passing the fluid sample through the flow cell under laminar flow conditions with a second fluid, wherein selective contact with the at least one discrete sensing area is controlled by adjusting the relative flow rates of the fluid sample and the second fluid.

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22. The method according to claim 21 wherein the fluid sample passes through the flow cell under laminar flow conditions with the second fluid, and further with a third fluid located on the other side of the flow of the sample fluid so that the laminar flow of the sample fluid is sandwiched between the second and third flows.

23. The method according to claim 21 wherein the relative flow rates of the sample fluid and the second flow are adjusted to bring the sample fluid into contact with one of the at least two discrete sensing areas that was not previously in contact with the sample fluid.

24. The method according to claim 22 wherein the relative flow rates of the second and third flows are adjusted to bring the sample flow into contact with one of the at least two discrete sensing areas that was not previously in contact with the sample fluid.

25. The method according to claim 21 or 22 wherein one of the at least two discrete sensing areas is a sensitized sensing area.

26. The method according to claim 21 or 22 wherein one of the at least two discrete sensing areas is a sensitized reference area.

27. The method according to claim 21 or 22 wherein one of the at least two discrete sensing areas is a non-sensitized reference area.

28. The method according to claim 27 wherein the non-sensitized area was previously a sensitized sensing area.

29. A method of analyzing association of an analyte in a fluid sample, which method comprises:

providing a flow cell having a sensing area on a wall surface thereof, the sensing area being capable of interacting with the analyte;

passing fluid sample in a first laminar flow through the flow cell;

passing analyte-free fluid in a second laminar flow through the flow cell, the second laminar flow being adjacent to the first laminar flow and forming an interface therewith which extends along the wall surface;

in a first state, setting the relative flow rates of the laminar flows to place the interface between the laminar flow such that the sample fluid flow does not contact the sensing area;

in a second state, changing the relative flow rates of the laminar flows to displace the interface laterally such that the sample flow contacts the sensing area; and

determining association of analyte in the sample flow to the sensing area.

30. A method of analyzing dissociation of an analyte in a fluid sample, which method comprises:

providing a flow cell having a sensing area on a wall surface thereof, the sensing area being capable of interacting with the analyte;

passing fluid sample in a first laminar flow through the flow cell;

passing analyte-free fluid in a second laminar flow through the flow cell, the second laminar flow being adjacent to the first laminar flow and forming an interface therewith which extends along the wall surface;

in a first state, setting the relative flow rates of the laminar flows to place the interface between the laminar flows such that the sample fluid flow contacts the sensing area;

in a second state, changing the relative flow rates of the laminar flows to displace the interface laterally such that the sample flow does not contact the sensing area; and

determining dissociation of analyte from the sensing area.

31. A sensor device comprising a flow cell having an inlet end and an outlet end, at least one sensing surface on a wall surface within the flow cell located between the inlet and outlet ends, wherein the flow cell has at least two inlet openings at the inlet end, and at least one outlet opening at the outlet end, such that separate laminar fluid flows entering the flow cell through the respective inlet openings can flow side by side through the flow cell over the sensing surface.

32. The sensor device according to claim 31 wherein the flow cell has two inlet openings and at least one outlet opening.

33. The sensor device according to claim 31 wherein the flow cell has three inlet openings and at least one outlet opening to permit establishment of three adjacent laminar flows in a sandwich fashion through the flow cell.

34. The sensor device according to claim 32 or 33 wherein the flow cell further has at least two additional inlet openings and at least one additional outlet opening arranged essentially transversely to the fluid pathway between the inlet and outlet ends.

35. The sensor device according to claim 32, 33 or 34 wherein the sensing surface is turnably mounted within the flow cell.

36. The sensor device according to claim 31 wherein the sensing surface has at least two discrete sensing areas thereon.

37. The sensor device according to claim 36 wherein one of the at least two discrete sensing areas is a reference area.

38. The sensor device according to claim 36 wherein one of the at least two discrete sensing areas is capable of specifically interacting with an analyte.

39. A sensor system, comprising a sensor device according to any one claims 31-38 and further comprising:

means for applying laminar fluid flows through the inlet openings, such that the laminar fluid flows pass side by side through the flow cell over the sensing surface;

means for varying the relative flow rates of the laminar flows of fluids to vary the respective lateral extensions of the laminar flows over the sensing surface; and

detection means for detecting interaction events on the sensing surface.

40. The sensor system according to claim 39 wherein the detection means comprises an optical sensor.

41. The sensor system according to claim 40 wherein the optical sensor is based on evanescent wave sensing.

42. The sensor system according to claim 40 wherein the optical sensor is an SPR-sensor.

Sub A 43. A method of synthesizing compounds, comprising sensitizing a discrete sensing area on a sensing surface by the method according to any one of claims 1-16, wherein such sensitization constitutes the successive addition of chemical moieties to achieve compound synthesis.

44. A method of synthesizing peptides or oligonucleotides, comprising sensitizing a discrete sensing area on a sensing surface by the method according to any one of claims 1-16, wherein such sensitization constitutes the successive addition of peptidic or oligonucleotidic moieties to achieve peptide or oligonucleotide synthesis.